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ABSTRACT

The agri-industry curriculum for the Fort Benton school system was developed with funds under Title III of the Elementary and Secondary Education Act as part of the vocational technology curricula to develop skills and attitudes that will permit students to find satisfaction and success in their careers. The curriculum consists of agri-industry orientation (grade 9), metallurgy-welding (grade 10), agri-equipment (grade 11), and agri-industry specialization (grade 12). Objectives and instructional resources are specified for each grade level. (JH)

FORT BENTON AGRI-INDUSTRY CURRICULUM OUTLINE

ED 062037

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TABLE OF CONTENTS

FOR

FORT BENTON AGRI-INDUSTRY CURRICULUM OUTLINE

		Page
Preface		1
Statement of Philosophy		2
Introduction		3
Terminology		4
Basic Goals		6
Themes and Their Rationale		7
General Notes		8
Agri-Industry Orientation	(Grade 9)	9
Welding	(Grade 10)	11
Agri-Equipment	(Grade 11)	13
Agri-Industry Specialization	(Grade 12)	15
Revision		21
Appendix A		24
School System Self-Survey		25
Appendix B		27
Curriculum Development		28
Appendix C		31

PREFACE

The means by which a small rural school system might provide a continuing curriculum development process are limited fiscally in most areas of Montana. Through the acquisition of a federal grant under ESEA Title III, we in the Fort Benton System have been able to overcome this limitation to some degree. Found in the pages of this curriculum outline are the efforts of Fort Benton teachers and administrators as well as the efforts of personnel from seven other Montana schools.

In today's paper world we often measure success by the volume of the printed word. The efforts put forth by the people involved in this project in no way can be acknowledged simply through an observance of volume. The real success of the program appears in the regeneration of teaching philosophy, methodology and enthsiasm. These in most part will show in the benefits rendered the students in the years to come.

I am not only proud to have been a part of this project, but also thank all the people involved for their cooperation. Any success or benefits of the project are theirs.

Members of this project from the Fort Benton School System will be available for consultant service to any organization or school district with regard to the outline contained herein or any other part of the project.

William J. Hoppes
Superintendent of Schools

STATEMENT OF PHILOSOPHY

Our primary purpose is to create vocational technology curriculums in specific areas which will help each student develop into a constructive citizen. The student will have the opportunity to develop cooperative attitudes toward society, acquire values consistent with the democratic creed and obtain a dependable body of knowledge and technical skills. The Vo-Tech curriculum will assist in the development of those skills and attitudes which will permit students to find satisfaction and success in their careers.

We believe that in order to make our vocational technology curriculums more meaningful for our students a planned scope and sequence is necessary. In order to accomplish this the student will explore areas within the scope of vocational technology. These areas are Business Education, Home Economics, Agri-Industry, Trades and Industry, and Industrial Arts.

Through these vocational technology areas the student will have the opportunity to integrate into his life learning processes, self-expression and skill development.

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INTRODUCTION

This Agri-Industry Curriculum was developed primarily for the Fort Benton School System by a committee representing several Montana School Districts. The project was funded through an ESEA Title III grant to the Fort Benton Public Schools.

The writing of this curriculum outline involved a highly concentrated six-week effort on the part of each individual committeeman. The Agri-Industry curriculum project personnel were:

James A. Longin	Fort Benton	Project Director
Robert Jerome	Fort Benton	Group Leader
Rus Axtman	Fort Benton	Student Consultant
Gail Stensland	Fort Benton	
Charles Bateman	Malta	
John Hashley	Big Sandy	

TERMINOLOGY

1. AGRI-MACHINERY - refers to implements used for producing and marketing crops and livestock.

2. AGRI-INDUSTRY - refers to the total economic aspect of agriculture including production, marketing, processing, wholesaling, retailing, research, etc.

3. AGRI-INDUSTRY SPECIALIZATION - refers to a group of special agriculture areas that may be pursued on an individual, small group or large group basis.

4. A.I.S.I. - American Iron and Steel Institute.

5. ALLOY - a substance composed of two or more materials of which at least one is a metal.

6. ANATOMY - study of the physical structure and systems of the animal body.

7. ARC - a sustained luminous discharge of electricity across an air gap in a circuit or between electrodes.

8. BEHAVIORAL CONCEPT - refers to those concepts written in behavioral terms which are intended to further develop the grade level theme.

9. BEHAVIORAL INSTRUCTIONAL OBJECTIVE - refers to those objectives used to measure the terminal behavior of the student which are intended to help develop the behavioral concept and in turn the grade level theme.

10. BLOWHOLE - a defect in metal caused by hot metal cooling too rapidly when excessive gaseous content is present. Specifically, in welding, a gas pocket in the weld metal, resulting from the hot metal solidifying without all of the gases having escaped to the surface.

11. CAPITAL - 1. The value of accumulated goals. 2. A stock of accumulated goods especially at a specified time in contrast to income received during a specified period.

12. CONSERVATION - planned management of a natural resource to prevent exploitation, destruction, or neglect.

13. ELECTRODE - a conductor used to establish electrical contact with a non-metallic part of a circuit.

14. GOALS - refers to those thirteen basic goals established by this committee as the over-all concern of this curriculum.

15. GRADE LEVEL THEME - refers to that theme which is being developed at that particular grade level.

16. INCULSION - slag and/or foreign particles that do not float to the surface of the molten metal before the metal solidifies.

17. INTERNAL COMBUSTION - a rapid burning of hydrocarbons within a closed chamber.

18. LUBRICANT - anything that makes slippery.

19. MAJOR THEME - refers to that theme which is being developed throughout the entire curriculum, "the expanding social order."

20. NUTRIENTS - any substances or ingredients that provide energy value and promote chemical reactions as pertaining to the animal and plant body.

21. OCCUPATIONAL HAND SKILLS - refers to those hand skills pertaining to hand tools and power equipment used in occupational employment.

22. OTHER AGRI-INDUSTRY CAREERS (RELATED AGRI-INDUSTRY CAREERS) - refers to those areas of Agriculture that are not production oriented (farming and ranching) but relate to the processing, marketing, wholesaling, retailing, etc.

23. PHYSIOLOGY - the organic processes and phenomena of an organism or any of its parts or of a particular bodily process.

24. S.A.E. - Society of Automotive Engineers.

25. PRODUCTION CAREERS - refers to farming and/or ranching.

26. SEEDBED - a soil prepared for planting of seeds.

27. SOIL FERTILITY - the quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature and the physical condition of the soil are favorable.

28. SOIL MAP - refers to a drawing or a picture of an area of land that will show only a few characteristics of the land and/or soil.

BASIC GOALS

This project group identified thirteen basic goals in the field of Vo-Tech. These goals are stated as follows:

1. Develop an appreciation of vocational technology.
2. Develop an insight and understanding of employment opportunities.
3. Develop the ability and enthusiasm for continuous learning.
4. Develop basic skills in the proper and safe use of common tools, machines, and processes used in the vocational areas.
5. Develop desirable social relationships.
6. Develop the insight with which the student can become aware of his capabilities.
7. Develop marketable skills and vocational competence to meet the needs of the students.
8. Develop consumer attitude whereas students can select, buy, use, and maintain the products of industry more intelligently.
9. Develop technical skills that can be applicable to the student for personal use.
10. Develop an insight into the world of work and its place in our culture.
11. Develop the abilities and enthusiasm for creative expression involving the materials, the processes and the products of vocational technology.
12. Develop the abilities for problem solving.
13. Develop an understanding of industrial processes and the practical application of scientific principles.

THEMES AND THEIR RATIONALE

At each grade level a theme is identified and a rationale is indicated for that theme.

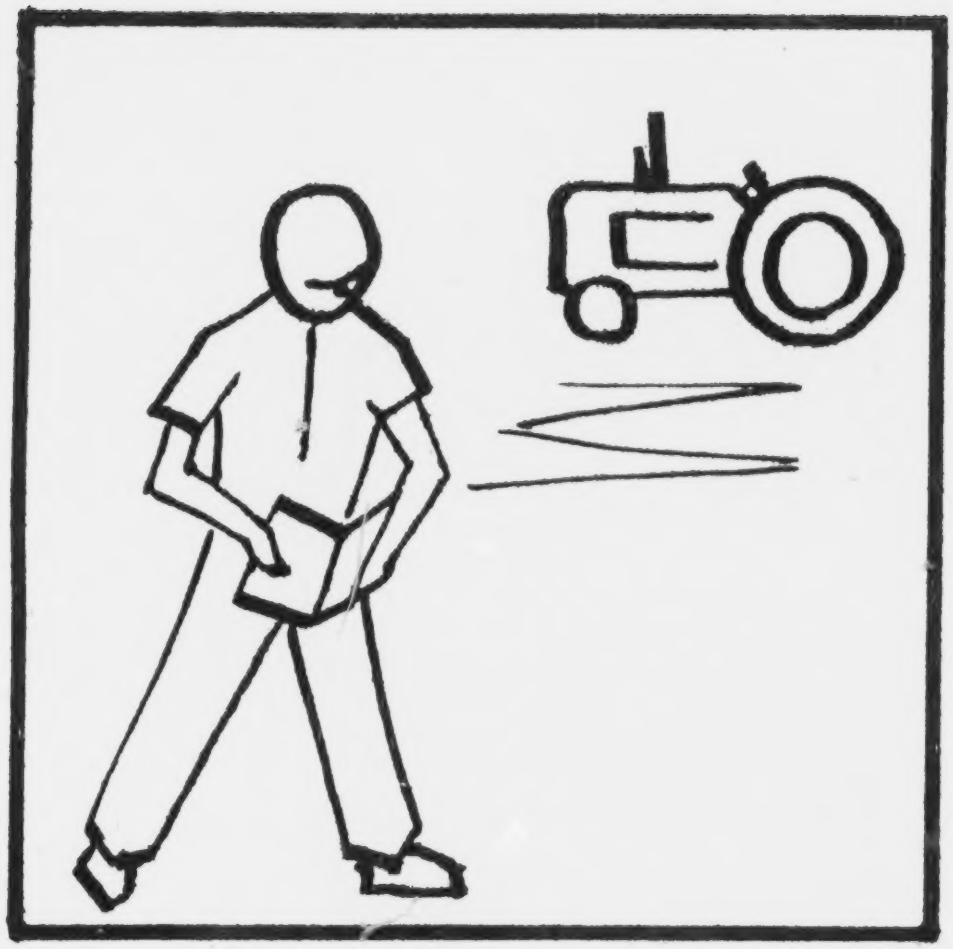
Grade Level	Theme	Rationale
9	Agri-Industry Orientation	1. Agri-Industry is offered because of the economic environment in which we live. An effort will be made through this course to develop and broaden the student's interests in agriculture and related fields. 2. The orientation program on this level will give the student the opportunity to develop an awareness of the many areas and career opportunities of agri-industry. 3. The students have reached a maturity level where a higher degree of proficiency in various hand skills and leadership training can be developed.
10	Metallurgy - Welding	1. Welding is playing an important role in the expansion and production within our industries. It is becoming one of the principal means of fabricating and repairing metal products. 2. The student has reached a further maturity level where he can develop his manipulative skills through welding.
11	Agri-Equipment	1. Because agri-industry is a highly mechanized industry, the student must be knowledgeable of the proper maintenance and services of current machines. 2. New developments and improvements in equipment are occuring. Therefore, the student should have the opportunity to become aware of these changes.
12	Agri-Industry Specialization	1. With the previous agri-industry programs, the student has obtained enough background where he can explore areas of specific areas.

GENERAL NOTES

1. The Agri-Industry Curriculum has assumed the responsibility of providing students with experiences in WELDING that will satisfy not only the Agri-Industry needs in welding but also the needs demanded by the Trades and Industry curriculum.

2. The trades and Industry curriculum will provide students with the opportunity to have various experiences with SMALL ENGIN maintenance and repair, thus fulfilling the Agri-Industry curriculum needs in this area.

3. Cross-referencing in the Agri-Industry Curriculum area, the Trades & Industry Curriculum area and the Industrial Arts Curriculum area is a necessity. It is recommended that the instructors of these areas be in constant communication with one another concerning the needs of their students as they move in and out of each specific curriculum.



AGRI-INDUSTRY ORIENTATION

GRADE NINE

AGRI-INDUSTRY ORIENTATION

I. Develop an understanding of Agri-Industry Careers.

A. The student will be able to discuss and describe careers in Agri-Industry.
B. The student will be able to contact resource people for career information.
C. The student will be able to differentiate between production careers and other agri-industry careers.

II. Develop an appreciation of leadership education.

A. The student will have the opportunity to communicate with others.
B. The student will demonstrate leadership through cooperative attitudes (e.g., sharing of time and talents), honesty (e.g., can be trusted to do that which is asked of him), and personal dress and grooming.

III. Develop an understanding of tractor safety and maintenance.

A. The student will be able to identify safe tractor operation procedures.
B. The student will operate a tractor in a safe manner.
C. The student will identify tractor maintenance procedures.
D. The student will be able to maintain a tractor for daily operation.

IV. Develop a further proficiency in occupational hand skills.

A. The student will identify hand tools and power equipment (e.g., hammers).
B. The student will describe safe procedures in using hand tools and power equipment.
C. The student will demonstrate the proper operation of hand tools and power equipment.

Example of Behavioral Instructional Objective:

Given 25 hand tools, the student will correctly identify 20 by using proper terminology.

RESOURCES:

Books:

Successful Farming Teaching Guide on Agri-Industry Careers, Vol. 1 - Merideth Co., Guidance Dept.
Dictionary of Occupational Titles, Vol. I and II - Guidance Dept.
Encyclopedia of Careers and Vocational Guide, Vol. I - Guidance Dept.
Lovejoy's Career and Vocational School Guide - Guidance Dept.
Occupation Outlook Handbook - Guidance Dept.
Your Future In Series (76 volumes) - Guidance Dept.
Careers in Agri-Business and Industry - Interstate, 631.1
Exploring Agribusiness - Interstate, 631.1
Your Future in Agriculture - Richard Rosen Press, 630.69

Opportunities in Vo-Ag - Interstate
Official FFA Manual - FFA Supply Service
Robers Rules of Order - Interstate
Now You're Talking - Interstate
The FFA and You - Interstate
Leadership Education - M.S.U.
Montana History of FFA - Montana Dept. of Public Education
Annual Report of FFA Foundation - Magazine
Activities and Awards Bulletin - Magazine
FFA Advisors Role - M.S.U.
Proceedings of National FFA Conventions
The World of the Veterinarian - Lothrop, Lee, Shepherd Co., 636.8
Farm Mechanics Texts and Handbook - Interstate
Operating Farm Tractors and Machinery - Extension Service
Tractor Operation and Daily Care - AAEIM
Tractor Maintenance Principles and Procedures - AAEIM
The Farm Shop - Interstate
Shop Work on the Farm - Interstate
Deltacraft or Rockwell Handbooks (11 volumes) - Rockwell Manufacturing Co.
Tool Identification Manual - VEP, 631.3
Fundamentals of Service - Shop Tools - John Deer, 631.3

Filmstrips:

Adjusting Band Saw (Title I), 694ae
Adjusting Radial Arm Saw #2 (Title I), 694af
Adjusting Radial Arm Saw #3 (Title I), 694 ag
Using Band Saw, 694 ah
Adjusting Radial Arm Saw #1 (Title I), 694 ai
Adjusting Radial Arm Saw #4 (Title I), 694 aj
Preparing a Drill Press for Drilling (Title I), 694 ak
Surfacing Board with Jointer (Title I), 694al
Care and Use of the Band Saw (Title I), 694am
Preparing a Grinder (Title I), 694 aa
Sawing with Radial Arm Saw #1 (Title I), 694ab

WELDING

GRADE TEN

WELDING

I. Develop an understanding of welding, metal characteristics and welding symbols.

A. The student will be able to list four or more parts (ideas) as to why welding is an essential skill.
B. The student will define properties of metal (e.g., tensile strength, ductility, elasticity, brittleness, stress and strain, toughness, hardness, compression strength, fatigue, weldability, corrosion resistance, etc.).
C. The student will describe the structure of metal (e.g., grain size, lattice formation, etc.).
D. The student will identify the effects of heat on grain structure.
E. The student will describe the importance of carbon in steel.
F. The student will describe how the rate of cooling affects the grain structure.
G. The student will describe the factors altering strength and structure of steel and alloy steels.
H. The student will describe the effect of heat on metal during the welding process.
I. The student will describe the classification of low, medium, high and very high carbon steels.
J. The student will identify and describe alloy steels.
K. The student will identify and describe the S.A.E. and A.I.S.I. steel code classifying systems.
L. The student will heat-treat metals (e.g., temper, annealing, etc.).
M. The student will describe expansion and contraction and the effect these have on the strength of a welded joint.
N. The student will control expansion and contraction forces by proper edge preparation and putup, minimizing heat input, preheating, peening, jigs, fixtures, number of passes, and positioning parts.
O. The student will identify and describe blowholes and inclusions.
P. The student will define and use welding symbols.

II. Develop a proficiency in and an understanding of arc welding.

A. The student will identify welding machines and equipment using the proper terminology.
B. The student will identify, describe, and demonstrate safe operating procedures.
C. The student will describe the process of arc welding.
D. The student will identify and select correct size of electrodes.
E. The student will demonstrate how to strike an arc.
F. The student will demonstrate the ability to run continuous beads or mild steel in the flat, horizontal, vertical and overhead position.
G. The student will identify and demonstrate the ability to weld cast iron, high carbon, and low alloy steel.
H. The student will demonstrate the ability to weld pipe.
I. The student will demonstrate the ability to cut metal with the arc.

III. Develop a proficiency in and an understanding of oxy-acetylene welding.

A. The student will identify welding equipment using the proper terminology.
B. The student will identify, describe, and demonstrate safe operating procedures.

C. The student will describe the process of oxy-acetylene welding.
D. The student will demonstrate the ability to run continuous beads or mild steel in the flat, horizontal, and vertical position.
E. The student will demonstrate the ability to braze.
F. The student will demonstrate the ability to weld cast iron and pipe.
G. The student will demonstrate the ability to hard-surface.
H. The student will describe the oxy-acetylene flame cutting process.
I. The student will demonstrate the ability to cut metal using the oxy-acetylene flame.

Example of Behavioral Instructional Objective:

The student will select the proper tools and equipment and arc weld a pad 2 inches by 2 inches using four criss-cross layers.

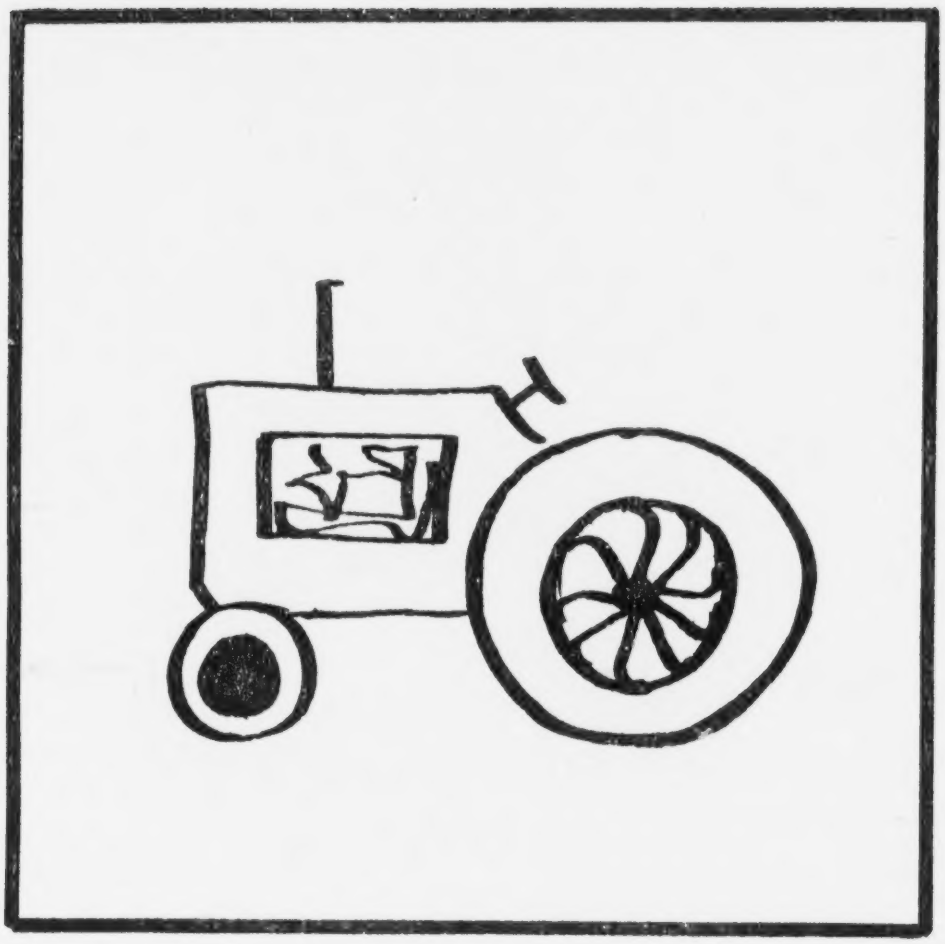
RESOURCES:

Books:

Welding Skills and Practices - American Tech. Soc.
Modern Welding - Goodheart-Wilcox
Smith's Short Course for Gas Cutting, Welding, Brazing - Smith
Students' Guide for the Lincoln Short Course in Arc Welding - Lincoln
Arc Welding Lessons for School and Farm Shop - Lincoln
Arc Welding Instruction for the Beginner - Lincoln
New Lessons in Arc Welding - Lincoln
Metals and How to Weld Them - Lincoln
Welding and Cutting (Gas and A.C. Arc)
Modern Arc Welding - Hobart
The Oxy-Acetylene Handbook- Linde

Filmstrips:

Electric Arc Welding, 671a
Practicing Arc Welding, 671b
Selecting and Using Equipment, 671c
Process Equipment and Safety - Arc Welding, 671d
Flat Position Welding - Arc Welding, 671e
Vertical, Overhaul, and Horizontal Position Arc Welding, 671f
Competition and Research - Steel Industry (Title I), with guide, 672
The Chemistry of Iron (Title I), with guide, 672.1
The Cradle of an American Industry (Title I), with guide, 672a
Money at Work in the Steel Industry (Title I), with guide, 672b
A Class Studies Rubber (Title I), with guide, 678



AGRI-EQUIPMENT

GRADE ELEVEN

AGRI-EQUIPMENT

I. Review and develop the students understanding of power equipment.

A. The student will be able to describe fundamental principles of engines. (e.g., combusion, power, exhaust, intake, cycle, etc.).
B. The student will demonstrate how to lubricate engines.
C. The student will demonstrate how to start and operate an engine.
D. The student will demonstrate how to adjust an internal combustion engine.
E. The student will demonstrate how to maintain an internal combustion engine.
F. The student will be able to identify the parts of an internal combustion engine.

II. Develop an understanding of trucks and tractors.

A. The student will list and describe the factors that should be considered when selecting a truck (e.g., price, maintenance, size needed, etc.).
B. The student will list and describe the factors that should be considered when selecting a tractor (e.g., price, type needed, size, maintenance, etc.).
C. The student will demonstrate how to operate a tractor.
D. The student will demonstrate how to operate a truck.
E. The student will demonstrate an understanding of truck maintenance (e.g., check oil, grease, check tires, etc.).
F. The student will demonstrate how to maintain a tractor (e.g., brakes, pulley, oil, engine repair, etc.).

III. Develop an understanding of Agri-Machinery.

A. The student will be able to describe types of equipment included in the term "agri-machinery", (e.g., seeding, tillage, harvesting, and haying equipment such as drills, plows, combines, swatharms, etc.).
B. The student will be able to describe the factors necessary for selecting suitable agri-machinery (e.g., availability of repairs, general machine design, adaptability to the work, ease of operation, reliability of the manufacturer, cost of the machine, etc.).
C. The student will be able to demonstrate how to maintain and adjust field machinery.
D. The student will demonstrate how to select suitable tools and equipment for repairing agri-machinery.
E. The student will be able to demonstrate repair jobs on agri-machinery (e.g., replacing belts, chains, bearings, sharpening sickle blades, discs, alignment of sprockets, repairing clutches, gears, etc.).

IV. Develop an understanding of Hydraulics.

A. The student will be able to describe the fundamentals of hydraulic principles (e.g., pressure, flow, fluids, liquids, levers, forces, etc.).
B. The student will be able to demonstrate how to service, adjust and maintain valves, pumps, and cylinders.

Example of Behavioral Instructional Objective:

The student will select the proper tools and equipment and change the crankcase oil and oil filter in a truck with 100% accuracy.

RESOURCES:

Books:

Tractor Maintenance Principles and Procedures - AAEIM
Tractor Operation and Daily Care - AAEIM
FOS - John Deere Manuals
Machinery Manuals (Obtainable from Machinery Dealers)
Tractor Hydraulics - AAEIM
Tractor Electrical Systems - AAEIM
Field Mowers - AAEIM
Tractor Fuels and Lubricants - AAEIM
Ball and Roller Bearings - AAEIM
Mechanics in Agriculture - Interstate, 631.3
The Operation, Care and Repair of Farm Machinery - Deere and Co., 631.1
Farm Tractor Maintenance - Interstate, 631.3

AGRI-INDUSTRY SPECIALIZATION

GRADE TWELVE

AGRI-INDUSTRY SPECIALIZATION

This course will provide the student an opportunity to investigate those areas which are of special interest to him personally.

After an introduction and description of specific areas, the student will have a choice of study an as individual or in a small group situation.

The time or depth spent on each area is flexable and can be set by the student and instructor

. The following major concepts are an outline of what the student can expect to study in each of the specialized areas of interest to him.

I. Develop an understanding of the specialized terminology.

II. Develop an understanding of career opportunities in the specialized areas.

III. Develop an understanding of requirements to obtain a level of proficiency in the specialized areas.

IV. Develop understanding, appreciation and skills in the specialized areas.

* * * * * * * * * * *

The following detailed areas can be used as example units of instruction in Agri-Industry Specialization.

I. Develop an understanding of and a proficiency in plant and soil science.

A. The student will be able to identify common local seeds and plants.
B. The student will describe and identify the parts, systems, and processes of plants (e.g., reproductive, roots, stems, leaves, etc.).
C. The student will describe and identify range and crop conditions (e.g., overgrazing, deficiencies, etc.).
D. The student will select quality seed.
E. The student will describe how to prepare a seed bed.
F. The student will list factors that will improve soil fertility.
G. The student will describe and identify plant nutrients (e.g., inorganic and organic fertilizers, water, minerals, etc.).
H. The student will describe plant breeding methods (e.g., pure lines, hybridization, etc.).
I. The student will describe week control methods (e.g., mechanical, chemical, etc.).
J. The student will describe methods of controlling insects and diseases (e.g., insecticides, smuts, rust, blight, mosiac, etc.).
K. The student will describe the nature of soils and list the properties of soils (e.g., soil components, soil properties, soil classification, soil sampling, etc.).
L. The student will list and describe methods of soil conservation (e.g., erosion by water, wind, erosion control measures, etc.).
M. The student will describe factors on how to evaluate land (e.g., identifying land use classes, land judging, principles of land use, etc.).
N. The student will demonstrate how to evaluate land (e.g., appraisal soil productivity, etc.).

O. The student will list and describe agencies assisting in soil and water conservation (e.g., S.C.S., A.S.C.S., etc.).
P. Describe and demonstrate how to read and interpret soil maps.
Q. The student will be able to describe and demonstrate soil testing methods, procedures, and use of soil testing results.

II. Develop an understanding and a proficiency in veterinary science.

A. The student will be able to describe the digestive systems of cattle, horses, and sheep and related problems such as bloat, founder, impaction, parasites, etc.
B. The student will be able to describe the genital system of the female farm animal and related problems such as pregnancy symptoms, calf pullers, prolapse of vagina, etc.
C. The student will be able to describe the farm animal urinary system and related problems such as urinary calculi, cystitis and nephritis, castration, etc.
D. The student will be able to describe the structure and diseases of the foot.
E. The student will be able to describe farm animal poisoning (e.g., metallic, plant, synthetic, autotoxins, etc.).
F. The student will be able to describe infectious diseases of cattle, sheep, horses and swine, (e.g., blackleg, malignant edema, leptospirosis, bump jaw, ringworm, etc.).
G. The student will be able to describe conditions of newborn farm animals, (e.g., weak calves or lambs, pneumonia, etc.).
H. The student will be able to describe miscellaneous or ungrouped diseases such as mastitis, milk fever, ketosis, asthma, tetnus, cancer eye, dwarfism, etc.).

III. Develop an understanding of business analysis and law.

A. The student will be able to describe and demonstrate how to keep records.
B. The student will be able to describe and demonstrate how to analyze records.
C. The student will be able to describe business-management practices (e.g., optimum production levels, cropping program analysis, livestock program analysis, building program analysis, farmstead planning, etc.).
D. The student will be able to describe lawful aspects of buying and selling capital, leases, contracts, boundaries and fences, water rights, borrowing money, taxes, hazard protection (insurance), deaths and wills, etc.

IV. Develop an understanding of animal science.

A. The student will be able to describe and identify breeds (e.g., herefords, quarter horse, landrace, columbia, etc.).
B. The student will be able to describe, identify, and demonstrate methods of handling livestock (e.g., restraint, castrating, dehorning, branding, etc.).
C. The student will be able to describe anatomy and physiology systems (e.g., circulatory, respiratory, skeletal, muscular, digestive).
D. The student will be able to describe and demonstrate how to select animals for functional efficiency.
E. The student will be able to describe the aspects and methods of animal reproduction (e.g., genetics, reproductive systems, breeding systems, etc.).

F. The student will be able to describe the economic and aesthetic values of and environmental factors affecting wildlife.
G. The student will be able to describe and identify methods of livestock production management (e.g., certification and classification programs, pre-conditioning, etc.).
H. The student will be able to describe how to plan livestock facilities.
I. The student will be able to describe how to market livestock (e.g., preparing and shipping, market classes, livestock grades, marketing considerations, parity and parity prices, etc.).
J. The student will be able to identify methods of livestock marketing (e.g., direct, country dealers, terminal markets, auction markets, etc.).

V. Develop an understanding and insight of other interest areas in agri-industry.

A. The student will be able to investigate other areas of Agri-Industry (e.g., surveying, mechanical skills - lathe, welding, farm building construction - horticulture, fabrication, agri-ecology, and recreation, etc.).

Example of Behavioral Instructional Objective:

The student will select the proper tools and equipment and subcutaneously vaccinate a calf for blackleg with 100% accuracy.

RESOURCES:

Books:

Profitable Soil Management - Knuti, Korpi, Hide, Prentice Hall
Soil Management (Unit Outline/Student Guide) - M.S.U.
Range Resource Management - M.S.U.
Leadership Education - M.S.U.
Agricultural Management - M.S.U.
Veterinary Science - M.S.U.
Animal Nutrition Handbook - M.S.U.
Guidance Through the Vo-Ag Teacher - M.S.U.
Rancher and the Law - M.S.U.
Our Soils and Their Management - Interstate
Stockman's Handbook - Interstate, 636
Animal Science - Interstate
Plant Science in Agriculture - M.S.U.
Approved Practices in Farm Management - Interstate, 631
Approved Practices in Beautifying the Home Grounds - Interstate, 631
Farm Management Handbook - Interstate, 631
Soil Conservation In Perspective - John Hopkins Press, 631.4
Approved Practices in Soil Conservation - Interstate, 631.4
Farm Management Handbook - Interstate, 631
Soil Conservation In Perspective - John Hopkins Press, 631.4
Approved Practices in Soil Conservation - Interstate, 631.4
Experiments in Soil Science - California State Polytechnic College, 631.4
Swine Science - Interstate, 636.4
Approved Practices in Sheep Production - Interstate, 636.3
Approved Practices in Beef Cattle Production - Interstate, 636.2
The Yearbook of Agriculture - 1956, USDA, 636.08
Feeds and Feeding: Morrison - Morrison Publishing Co., 636.08

Filmstrips:

Farmers and Prices, 631.1
Farm Records, 631.1a
Expenses and Receipts, 631.1b
Labor, 631.1c
Galvanized Sheet for Farm Buildings, 631.2b
How to Judge Livestock, 631-1
How to Judge Livestock, 631-2
Breeds of Swine, 636a
Judging Sheep, 636b
Breeds of Sheep, 636c
Judging Hogs, 636d
Judging Beef Cattle, 636f
Judging Dairy Cattle, 636f
Breeds of Dairy Cattle, 636g
Beef Heifers, 636.2
Beef Bulls, 636.2a
Breeding Ewes, 636.3a
Breeding Rams, 636.3b
Selecting Breeding Gilts, 636.4
Breeding Boars, 636.4a
Vegetable Reproduction, 581a
Protoplasm Streaming, 581b
Optium Com. for Germination, 581c
Seedling Monocotyledon, 581d
Seedling Dicotyledon, 581e
Roots of Dictoyledon, 581f
Typical Plant Cell, 581g
Types of Root Systems, 581h
Root Hairs in Soil Particles, 581i
Nutrient Ions in Root Hairs, 581j
Rhozome Growh, 581k
Aerial Roots, 581l
Prop Roots (corn plant), 581m
Cross Section of Bean Seed, 581n
Types of Leaves, 581a-1
Leaf Modified Into Spine, 581b-1
Cross Section of Leaf, 581d-1
Section of Terminal Bud, 581e-1
Alternate Leaves on Shoot, 581f-1
Whorled Leaves on Shoot, 581g-1
Opposite Leaves on Shoot, 581h-1
Flower, 581
Field Bindweed, 581a-2
Canadian Thistle, 581b-2
Leafy Spruge, 581c-2
Red Clover, 581d-2
Parts of the Boar, 590a
Shoat, 590b
Parts of Sow, 590c
Parts of Sheep, 590d
Parts of Beef, 590e
Parts of Hen, 598a
External Parts of Hen, 598b
Internal Parts of Hen, 598c
Head of Hen, 598d

Parts of Dairy Cow, 590f
Reproductive Tract of Cow, 590g
Diagram of Ovary Not in Heat, 590h
Diagram of Ovary in Heat, 590i
Reproductive Tract of Bull, 590j
Insemination of Cow Uterus, 590k
Livestock Feed Efficiency, 636.08
Northwestern States: Agriculture, 630
Food (series), 630.1
Saving the Soil, 631.4
Forestry as a Career, 634.9
Using Our Forests Wisely, 634.9
Vegetables for the City, 635
Farm Animals, 636
Pets, 636
The Horse, 636.1
Goats, 636.1
Shep, The Farm Dog, 636.7
The Milk We Drink, 637
The Three Little Kittens, 636.8

Transparencies:

Soil Nutrients and Soil Micro-organisms, 631.4a
Soil Particles, 631.4b
Beef Carcasses (retail), 664.9a
Beef Carcasses (wholesale), 664.9b
Lamb Carcasses (retail), 664.9c
Lamb Carcasses (wholesale), 664.9d
Pork Carcasses, 664.9e

GENERAL RESOURCES:

Miscellaneous Books:

Building and Equipping the Farm Shop - Interstate, 631.2
500 Things to Make for Farm and Home - Interstate, 631.2
A Place to Live - USDA, 631
Ideas for Farm Mech Projects - Interstate, 631
Pleasant Valley - Harper and Row, 631
Plants, Food and People - Coward & McCann, 630.9
Farmers World - USDA, 630.1
American Farmers Movement - Vostrand, 630.1
Protecting Our Food - USDA, 630
After A Hundred Years - USDA, 630
Young Farmers - Interstate, 630
Profitable Soil Management - Prentice-Hall, 630
Farming Programs - Interstate, 630
Agriculture In Our Lives - Interstate, 630
Live and Learn - Interstate, 630
Marketing of Livestock and Meat - Interstate, 636
Gardener's World - Putnam's Sons, 635.9
Approved Practices in Beautifying the Home - Grounds, 631
Farm Equipment - Welding Plans, 671
Arc Welding Projects, 671

Greenhouse Gardening - Barrows, 635.9
Ikebana - Permabooks, 635
Trees - USDA, 634.9
Grass - USDA, 633
Plant Disease - USDA, 632
Seeds - USDA, 632
Seeds - USDA, 631.5
Using Commercial Fertilizers - Interstate, 631.5
Crops in Peace and War - USDA, 631.5
Power to Produce - Interstate, 631.5
Crop Production - Prentice-Hall, 631.5
Farm Shop Demonstration - Interstate, 631
Shop Work on Farm - McGraw-Hill, 631.3
Demonstrations for Farm Mechanics - Interstate, 631.5
Poultry Production - Interstate, 636.5
Pasture Management - Interstate
Meat We Eat - Interstate, 636
Livestock Judging - Interstate, 636
Basic Animal Husbandry - Prentice-Hall, 636

Filmstrips:

Industrial Arts Awards - 1954, 630
Use of Color in Farm Shop, 631.2
The Woods of Homes, 634.9b
Adventure with Flowers, with guide, 635.9
Basic Wiring, 621.32
2-cycle engine - A Unit of Instruction, 621.4
4-Cycle Engine - A Unit of Instruction, 621.4
Acetylene Welding, 673

Tapes:

Conservation Speakers, Tape 1 & 2, 393.7
Rip and Cross Cut Saw - How to Sharpen, 621.9

REVISION

The Vo-Tech curriculum was derived to create an organized pattern for the learning development of our students. As in any aspect of life, change is inevitable; therefore, we must constantly evaluate and revise this gide. The following evaluation instrument is to be completed by each teacher involved with this curriculum near the end of each semester.

EVALUATIVE INSTRUMENT

1. Are the themes indicated in this curriculum meaningful and relevant? If so, how? If not, why not?

2. Do the major concepts help develop the theme at that level? If so, how? If not, why?

3. Are the behavioral sub-concepts helpful in developing the main concept? If not, list those that need revision.

4. Are the concepts suited to the level and abilities of the students? If not, what do you suggest?

5. Are there any concepts that should be omitted? If so, which ones and why?

6. In your opinion are there any concepts that could and should be added? If so, why?

7. Is the content of the theme too great to be covered in the alotted time? If so, what would you delete?

8. Please list any new materials and ideas you have found helpful in your efforts to teach the concepts indicated.

9. Indicate those teaching approaches that you are using and list any others that you find useful.

10. What is your opinion of the total curriculum? Please explain.

APPENDIX A

SURVEYING FORT BENTON'S AGRI-INDUSTRY EFFORTS

Those staff members responsible for any portion of the Agri-Industry program were asked to respond to the attached survey instrument. The instrument is short and is composed of three parts. Each instructor was asked to indicate (1) the nature of the Agri-Industry offering at their level of instruction; (2) what the instructor considered the strengths of that offering; and (3) what the instructor considered the weaknesses of that offering.

The feedback obtained from this instrument is summarized as follows:

1. Fort Benton's past areas of emphasis were:

   Ag 9 - Basic Ag Science, Agri-Mechanics, Leadership Training (FFA)
   Ag 10 - Soils, Crops, Range, Agri-mechanics, Agri-Experience Program, Leadership Training (FFA)
   Ag 11 - Animal Science, Agri-Mechanics, Records
   Ag 12 - Farm and Ranch Management, Agri-Mech.

2. Strengths:

   a) An elective course open to individuals interested in Ag.
   b) Leadership development.
   c) Special projects and field trips.
   d) Flexibility.

3. Weaknesses:

   a) Irrelevancy of content of courses being taught with today's demands.
   b) Scheduling problems with block time effort.
   c) Limited enrollment.

SCHOOL SYSTEM SELF SURVEY

This survey is being distributed to those members of our staff responsible for any portion of our Vo-Tech program - Commercial
Industrial Arts
Vo-Ag
Home Ec.
T & I
- Each teacher is asked to reply to all the statements.

Teacher's Name_____

Teacher's Grade Level_____

I. What is the Nature of the Vo-Tech Offering presently at your grade level? (i.e., what themes, concepts, ideas, etc., do you teach with reference to Vo-Tech during the course of the year?)

a) Major Themes or Topics_____

_____

_____

_____

_____

b) Units_____

_____

_____

_____

_____

c) Concepts_____

_____

_____

_____

_____

d) Others_____

_____

_____

_____

_____

Comments:

II. What do you consider to be the strengths of this offering?

III. What do you consider to be the weaknesses of this offering?

APPENDIX B

CURRICULUM DEVELOPMENT SURVEY

Various college professors, learning laboratory representatives and State Department representatives were asked to respond to the attached instrument. The purpose was to obtain informative date in the English (Language Arts), Math, Science and Vo-Tech Curriculum areas. The instrument was designed to consider two major areas: (1) General information concerning the individual and agency that individual represented and (2) Specific curriculum information.

Thirty-one questionnaires were distributed; fourteen were returned. The following is an attempt to summarize the information.

It appears as if very few schools in the state are known to be developing curriculum guides at this time. Even though it was felt that many schools are beginning to do "something" in the realm of curriculum, the survey respondents did not for the most part indicate recommended places to visit. Of the programs and schools mentioned as doing "something" in curriculum it appeared that all had a tendency to be striving toward some form of individualization in those curriculum areas they were concentrating on.

CURRICULUM DEVELOPMENT

This survey instrument is being circulated among college professors, learning laboratory representatives and State Department representatives. The purpose is to obtain informative date in the English (Language Arts), Math, Science, and Vo-Tech Curriculum areas. Your reply to this instrument will be greatly appreciated. Results will be sent to you upon request. A return, self-addressed envelope has been enclosed for your convenience.

I. GENERAL INFORMATION

1. Name of Institution or Agency you represent_____

2. Describe the lines of communication you have with the local school districts in regard to curriculum development.

3. How many schools do you personally contact during the course of the year concerning curriculum development and improvement?

4. What is basically the area of concentration that you become involved with in your work with local school districts?

II. SPECIFIC CURRICULUM AREAS

1. Are you aware of any school districts that have developed or are in the process of developing curriculum guides or outlines in the areas of Language Arts, Math, Science and Vo-Tech? (If yes, please indicate.)

2. Are there any school districts you would recommend a visitation to concerning their curriculum development? (If yes, please indicate where.)

3. Are you aware of any worthwhile and interesting "new" happenings in the area of Language Arts - K-12? (If so, please relate.)

4. Are you aware of any worthwhile and interesting "new" happenings in the area of Math - K-12? (Please relate.)

5. Are you aware of any worthwhile "new" and interesting happenings in the area of Science - K-12? (Please relate).

6. Are you aware of any worthwhile "new" and interesting happenings in the area of Vo-Tech (Home Ec., Industrial Arts, Trades and Industry, Comercial, Vocational-Agricultural.) (Please Relate).

7. Do you have any lists of reference materials that you would share with us concerning any of these curriculum areas? (If so, please enclose list and return with questionnaire.)

APPENDIX C

Reference Material

A. Agri-Industry Orientation

1. Agri-Industry Careers #1 - 15 units)
2. Machinery Management #2 - 14 units) Successful Farming Vo-Ag Teaching Service - 1717 Locust Street, Des Moines, Iowa 50303
3. Farm Management #3 - 16 units :
4. Money Management #4 - 15 units)
5. Operating Farm Tractors and Machinery, Iowa State University, Cooperative Extension Service, Ames, Iowa, 1969, 81 pages.
6. Tractor Operation and Daily Care, MTC Bookstore, 909 So. Ave. W., Missoula, Montana 59301, 1970, 120 pages - Div. of McCall Printing Co.
7. Tractor Maintenance Principles and Procedures, MTC Bookstore, 909 So. Ave. W., Missoula, Montana 59301, 1970, 152 pages - Foote & Davis, Div. of McCall Printing Co.

B. Welding

1. Welding Skills and Practice, Giachino-Week-Brune, The American Technical Society, Chicago, Ill., 1967, 335 pages.
2. Modern Welding, Althouse-Turnquist-Bowditch, Goodheart-Wilcox, Homewood, Ill., 1967, 600 pages.
3. Arc Welding Instructions for the Beginner, H. A. Sosnin, The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, 1964, p. 149

C. Agri-Equipment

1. Mechanics In Agriculture, L. J. Phupps, Interstate Printers & Publishers, Danville, Ill., 1967, 800 pages.
2. Tractor Maintenance Principles and Procedures, MTC Bookstore, 909 So. Ave. W., Missoula, Montana 59301, 1970, Foote & Davison - Div. of McCall Printing Co.
3. Tractor Tune-Up and Service Guide, MTC Bookstore, 909 So. Ave. W., Missoula, Montana 59301, 1968, 22 pages, Foote & Davis, Div. of McCall Printing Co.
4. Selecting & Stirring Tractor Fuel and Lubricants, MTC Bookstore, Missoula, Montana, 1970, 54 pages.
5. Tractor Hydraulics, MTC Bookstore, Missoula, Montana, 1971, 45 pages.
6. Ball and Roller Bearings - MTC Bookstore, Missoula, Montana, 1971, 27 pages.
7. Field Mowers, MTC Bookstore, Missoula, Montana, 1966, 124 pages.

D. Agri-Industry Specialization

1. Basic Curriculum Guide for Production Agriculture in Texas - Texas Education Agency, Austin, Texas, 1971, 17 pages.
2. Stockmans Handbook, Ensminger, Interstate Printers, Ill., 960 pages, 1962.
3. Veterinary Science, 1968, 70 pages, M.S.U., Bozeman, Montana
4. Farm and Ranch Business Analysis, M.S.U., Bozeman, Montana, 1969, 108 pages.
5. The Rancher and the Law, M.S.U., Bozeman, Montana, 1967, 32 pages.